REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

In response to the drawing objections, the drawings have been amended so as to obviate all stated grounds for objection.

In response to formality-based objections to the specification and abstract, suitable amendments have also been made to obviate these grounds for objection.

In response to the formality-based objection to claims 16-21, these claims (and many others) have been amended so as to put them in more traditional U.S. format and to obviate all outstanding grounds for objection.

Accordingly, all outstanding formal issues are now believed to have been resolved in the applicants' favor.

The rejection of claims 1-18 under 35 U.S.C. §103 as allegedly being made "obvious" based on Theimer '812 in view of Kao '734 is respectfully traversed.

The Examiner asserts to have found in Theimer the feature of applicants' claim 1 "wherein each computer that has a said data item stored thereon has a least one node of virtual network for directory look up." However, the Examiner attempts to read this feature of applicants' claim 1 onto a paragraph of Theimer, which does not teach this feature. In particular, the Examiner cites to paragraph [0005] of Theimer, quoting therefrom: "the original server sends the request to the responsible server." However, this does <u>not</u> equate to the feature of applicants' claim 1 in question. Theimer does <u>not</u> teach a virtual network for directory look-up as required by applicants' claim 1.

The Examiner also asserts that Theimer teaches a server, in receipt of a request, being able to determine the server which maintains a master copy of the requested record. However, it is clear from Theimer, at paragraph [0008] as referred to by the Examiner, that the receiving server, rather than identifying the responsible server, is merely able to route the request <u>in the direction</u> of the responsible server (see "[i]f [the

server receiving the request] does not have a copy of the data record, it routes to request <u>towards</u> the server that has responsibility for the requested data record" (*emphasis added*). As explained by Theimer in the next following sentence, the routing may involve several steps, i.e., forwarding the request through multiple intermediary servers. In fact, Theimer teaches that the request will continue to be forwarded from server to server until it eventually reaches a server with a copy of the requested data record.

According to Theimer, the server at which the forwarding terminates (the server found with a copy of the requested data record) is not necessarily the server that is responsible for maintaining the master copy of that data record. Hence, according to Theimer, the server does not know, and does not need to know, the identity of the server responsible for a record. In fact, according to Theimer, a request for a data record may be satisfied without any involvement of the server responsible for that record. Theimer does not teach a virtual network for directory look-up as required by applicants' claim 1 wherein the network includes a plurality of nodes, each node associated with a virtual directory and having links to other nodes associated with the same virtual directory.

As set out in paragraph [0004], Theimer teaches servers arranged in a hierarchical tree structure. The "directories" identified in Theimer are sets of servers with each server of the set storing data relating to a particular topic (see paragraph [0005]). Paragraph [0028] clearly identifies Theimer's "directories" as being part of the Theimer database. The servers of a directory are arranged along the routes of an overlay network that lead to the server responsible for the master copy of that data record. It is this hierarchical structure that enables any server to know the direction of the server responsible for a data record without the server having to know the name or address of the responsible server.

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It is also important to note that, where Theimer refers to "network names," it is not referring to the network or overlay network described in Theimer, but rather to, for example, URLs identifying websites for which the database contains the relevant IP address. Hence, the network names in Theimer do not identify the servers of Theimer, but are, rather, labels to data records of the database.

The overlay network of Theimer is distinct from the virtual network of the present invention. Unlike the overlay network of Theimer, the virtual network of the applicants' invention responds to a virtual network directory look-up enquiry message with the identity of a computer holding a copy of the desired data record. This is not provided by Theimer.

The Examiner also refers to use of "associated sub-directories" as specified in Theimer. However, paragraph [0028] of Theimer actually describes, again, that the Theimer directories represent the segmentation of the Theimer database under subject headings. It is apparent that Theimer uses the term "directory" to describe an artifact of a database, whereas, in the applicants' invention, the virtual directories are artifacts of a virtual network. This is true, notwithstanding the reference in Theimer to the overlay network. It is admitted that the Theimer overlay networks may give rise to a virtual network, but, if so, a virtual network that is not organized or used in the same way as the virtual network of the applicants' claimed invention and one that does not comprise the virtual directories of the presently claimed invention.

The Examiner is mistaken in the assertion that Theimer teaches generation of an enquiry message identifying the computer. It is significant that the wording from Theimer selected by the Examiner to support this assertion does no such thing. The wording from Theimer's paragraph [0040] merely states that a desired record is sent to the [requesting] client once a copy of the desired record is found. This is described with reference to an example directory labelled "computers". The Examiner is reminded that

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the "directory" in Theimer is a completely different concept to that represented by "virtual directory" in the presently claimed invention.

As set out in Theimer's paragraph [0037], the directory "computers" contains multiple data records, each data record mapping a textual name of a website. Hence, Theimer's "directory" is essentially a form of database, an arrangement of data records. According to Theimer, copies of the directory/database may be spread among a plurality of servers. The virtual directory of the presently claimed invention comprises not data items, but a plurality of nodes, each node associated with a separate computer of the distributed computer system. The enquiry message of the presently claimed invention does not identify a desired data record, but a virtual directory (i.e., effectively a plurality of nodes). This is not taught by Theimer.

The Examiner misstates Theimer's wording at paragraph [0008]. This paragraph does not state that "each node can hash the record to determine which node contains its master copy," but rather that "each request contains a hash of the record to determine the node which contains the master copy."

What Theimer is here describing is a system in which a node is selected to store the master copy of a data record if its node address is closest in value to a hash of the data. This finds no equivalent in applicant's claim 1.

The Examiner goes on to assert that Theimer teaches data identifying the item with which the node is associated. However, this is also not found in Theimer which, instead, teaches that a server is selected for storing a data record by performing a hash calculation of the data record's name and then assigning the record to the server whose node ID is closest to the hash of the data record's name. There is no indication in Theimer that this hash is stored on the server, nor would there appear to be any need for this to happen.

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The Examiner also appears to be mistaken in an assumption regarding IP-routing. As set out in Theimer's paragraph [0040], the server with a copy of the desired directory/database sends the contents of the desired record, not to the source of the request (as implied by the Examiner), but rather to the first server in the network to have received the request. It is this, first server, that receives the IP communications from the other server (and may, as indicated by the Examiner, receive the source address of the other server in one or more IP packet). And it is this, first server, which forwards the contents of the desired data record to the client computer that is the source of the request. Hence, even taking into account the properties of the IP communication described in Theimer, there is no mechanism for transferring the address of the source of the response to the originator of the enquiry, as the first server in the network to have received the request interrupts this transfer. This is contrary to a requirement of applicants' claim 1 (as set out in the last seven lines) – and Theimer actually teaches <u>away</u> from this requirement.

The Examiner also fails to establish disclosure in Theimer of the node required by applicants' claim 1, which specifies that each computer has at least one node of a virtual network, thereby establishing that the computer and the node are distinct entities. At Theimer's paragraph [0008], it is described that each server of Theimer is allocated a node ID. This indicates that, in Theimer, the terms "server" and "node" are seen as interchangeable. This is not the case in applicants' claim 1 where it is clearly set out that each computer has at least one node, indicating that some computers may have more than one node, thereby confirming that there is no identity in the presently claimed invention between the computer and the node. In Theimer, the Examiner refers to the overlay network: a network linking the servers of Theimer. The Examiner is respectfully requested to clarify whether it is asserted that the servers of Theimer correspond to the computer of applicants' claim 1 or to the node of applicants' claim 1. The Examiner has to choose which of the computer and the node of applicants' claim 1 is seen as being disclosed in Theimer as, clearly, only one of these two is disclosed there.

The Examiner refers, at page 6 of the office action to: "whereby said linking data together define a plurality of computers for item look up." However, this text does not appear in applicants' claim 1. It is not clear whether the Examiner was intending to refer to the following text of claim 1: "whereby said linking data together define a plurality of <u>virtual networks</u> for item look up."

In any case, in relation to the Examiner's text, the Examiner refers to Theimer at paragraphs [0057] – [0061] where a detailed description is provided of an overlay network routing table, as illustrated in Fig. 6. The routing table has an entry for each server of the overlay network (servers being identified by a node ID). The lower part of an entry identifies servers whose node ID is <u>similar in content</u> to the node ID of the server in question. The upper part of an entry defines the so-called "leaf set." The leaf set lists the node IDs of servers whose node IDs are <u>numerically closest</u> to that of the local server.

The Examiner refers to this leaf set specifically in the assessment of applicants' claim 1. However, it is not apparent what relevance Theimer's leaf set has to the presently claimed invention. It is also noted that the Examiner does not attempt to demonstrate any relevance for the leaf set. It is, however, clear that Theimer's leaf set and routing table have no similarity to the "linking data" of applicants' claim 1.

Unlike Theimer's routing table and leaf set, the linking data of applicants' claim 1 comprises addresses of nodes <u>associated with an item</u> assigned to the same virtual directory as the node in question, whereas the routing table and leaf set identify nodes based on location in the overlay network with Theimer. Theimer is, therefore, unable to provide the benefit of the presently claimed invention in providing an enquirer with access to many copies of a data item, where each copy is stored on a different computer of a distributed computer system.

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The Examiner goes on in an attempt to establish a correspondence between the "retrieval means" of applicants' claim 1 and Theimer's operation. However, as demonstrated above, the Examiner's logic is based on incorrectly assuming equivalence between Theimer's directory and the virtual directory of applicants' claim 1.

For at least the above reasons, the activity described in Theimer in relation to identifying a data record within a directory does not provide the distributed computer system of applicants' claim 1 relating to a query identifying a virtual directory or a reply message identifying an item within that virtual directory.

The Examiner correctly acknowledges that Theimer does not teach the plurality of virtual networks for item look-up wherein each network corresponds to a different virtual directory. For this admitted deficiency, the Examiner relies upon Kao.

Before analyzing Kao, it is pointed out that the differences between the teaching of Theimer and the applicants' invention (as set out above) are so numerous and so critical that the mere fact that a skilled reader might be aware of a virtual network comprised of a plurality of different directories would not lead that skilled person to make the many changes required to the computer network of Theimer so as to approach the distributed computer system of applicants' claim 1 – under if Theimer and Kao are considered, *arguendo*, to have been somehow "combined."

In discussing Kao, the Examiner has chosen to use language derived from the applicants' claims, rather than that used by Kao. However, the skilled reader of Kao would not find there the plurality of virtual networks for item look-up wherein each network corresponds to a different virtual directory as required by applicants' claim 1. Instead, one of skill would understand that Kao is describing a file system arranged as a three-dimensional directory. Kao's three-dimensional directory is made up of directories, whereas the virtual directory of applicants' claim 1 is made up of nodes established at a plurality of computers of a distributed computer system. The plurality of Kao directories comprises a plurality of files, each file suitable for storing a number of

items of data. In contrast, the virtual directory of applicants' claim 1 need comprise no directories or files.

The advantages claimed for Kao's architecture is that of providing a three-dimensional file system capable of integrating diverse file systems. It is not clear what motivation the skilled reader of Kao would have to combine Kao's three-dimensional file system with the distributed data network of Theimer.

However, an attempt to do so, if successful, would be likely to lead to a three-dimensional version of Theimer – something far removed from the distributed computer system of applicants' claim 1.

The meaning of "three-dimensional" as used in Kao is explained at 5:56 to 6:7 with reference to Kao's Fig. 1. Kao's three-dimensional directory comprises a plurality of directories linked together such that if an enquiry fails to find the requested data in the first directory, the enquiry is passed on to successive directories until either the requested data is found or each directory has been searched. Hence, Kao's file system is aimed at linking different directories such that a single search can be carried out over a plurality of directories.

The virtual network for directory look-up of applicants' claim 1 is made up of nodes which identify other nodes within the <u>same</u> virtual directory and comprises linking data for identifying other nodes assigned to the <u>same</u> virtual directory. Kao's file system is completely different from the virtual directory of applicants' claim 1. Kao is designed to pass an enquiry from one directory to another, whereas the presently claimed invention is aimed at identifying other members of a <u>single</u> directory.

The organization and operation of the distributed computer system of applicants' claim 1 is very different from both Theimer's hierarchical tree structure and Kao's three-dimensional directory. Whereas it is difficult to predict exactly the result of combining Kao's three-dimensional directory with Theimer's network, this combination would <u>not</u>

result in the distributed computer system of applicants' claim 1 in which a node of the virtual directory acts to identify other nodes within the <u>same</u> virtual directory.

Most, if not all, of the above-noted deficiencies with respect to independent claim 1 are also applicable to independent claims 2, 6, 7, 11 and 13. Given such fundamental deficiencies of both cited references with respect to these independent claims, it is not believed necessary at this time to discuss the additional deficiencies of this allegedly "obvious" combination of references with respect to other features of the rejected claims.

The rejection of claims 19 and 20 under 35 U.S.C. §103 based on Theimer/Kao in further view of Bonsma '669 is also respectfully traversed.

Fundamental deficiencies of both Theimer and Kao have already been noted above with respect to a parent claim. Bonsma does not supply those deficiencies. Accordingly, it is not believed necessary at this time to discuss the additional deficiencies of this allegedly "obvious" three-way combination of references with respect to the additional features of claims 19 and 20.

The rejection of claim 21 under 35 U.S.C. §103 as allegedly being made "obvious" based on Theimer/Kao in further view of Yemini '889 is also respectfully traversed.

Once again, fundamental deficiencies of Theimer/Kao have already been noted above with respect to a parent claim. Yemini does not supply those deficiencies. Accordingly, it is not believed necessary at this time to discuss the additional deficiencies of this allegedly "obvious" three-way combination of references with respect to the additional features of dependent claim 21.
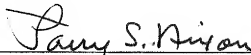
Accordingly, this entire application is now believed to be in allowable condition, and a formal notice to that effect is respectfully solicited.

Respectfully submitted,

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